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REF: A) Sao Paulo 260; B) Brasilia 593; C) Brasilia 672 D) Sao Paulo 314

SENSITIVE BUT UNCLASSIFED--PLEASE PROTECT ACCORDINGLY

¶1. (SBU) Summary: As the next big development in Brazilian biofuels, bioelectricity has been touted as the short-term solution to Brazil's potential electricity shortages. It is a clean source of electricity that requires little start-up time and is complementary to Brazil's predominately hydroelectric generation. In fact, the GOB has scheduled its first bioelectricity auction for July 30. Once used solely for plant generation, mills are now turning to bioelectricity because of its profitability as the price per megawatt of electricity in Brazil has steadily increased while sugar and ethanol prices have declined. Mills must weigh the upfront investment costs, which vary widely depending on access to electricity transmission lines, with bioelectricity's nearly guaranteed revenue stream. Bioelectricity production in Brazil is likely to increase as it provides another revenue stream for sugar and ethanol producers and ultimately, may be the decisive factor in determining which operators stay in business. There are prime opportunities for U.S.-Brazil bilateral cooperation on technological development in gasification that would advance the market for both biomass products. This is the fourth cable in a Mission-wide series on electricity in Brazil. End Summary.

What Is It?

¶2. (U) Bioelectricity is electricity derived from biomass, primarily from sugarcane in Brazil. Brazilian sugar and ethanol mills have been burning bagasse, the organic material left over after milling sugarcane, in high pressure steam boilers to generate enough energy for self-sustainability. However, sugar producers were indifferent about generation efficiency as long as they generated enough electricity to supply their production facilities. Investment incentives for upgrading to high pressure boilers in the late 1990s helped supply the first bioelectricity, and when Brazil experienced electricity black-outs in 2001, it became an invaluable source of electricity for many industries. Last year, the GOB showed the first signs of seriously considering bioelectricity to

supplement Brazil's electricity supply when it announced the first auction exclusively for bioelectricity, scheduled for July 30 of this year.

Silver Bullet

¶3. (SBU) Bioelectricity is the near unanimous short-term solution to potential electricity shortages in Brazil. As reported earlier, Brazil's electricity supply and demand picture is in precarious equilibrium (Ref A). Jeff Safford, Vice President for Business Development for AES Brazil, told Econoff that biomass generation, especially bioelectricity, is the only way to create the sufficient additional installed electricity capacity to deal with demand from now until 2011. Together 48 of the 405 Brazilian sugar mills generated approximately three percent of Brazil's electricity supply in 2007 (1,400 megawatts) and experts estimate that by 2011 bioelectricity production will double to six percent. Enormous potential efficiency gains by investing in high pressure boilers would triple electricity generation without increasing sugarcane production.

¶4. (SBU) Bioelectricity projects are generally small (particularly due to investment incentives for less than 30 megawatt (MW) generators), can come online in as few as two years, and have a smaller environmental footprint and limited environmental licensing issues compared to other projects such as new hydroelectric dams. The sugarcane industry in Brazil has the added advantage of decades of research and development to improve productivity as well as crop forecasts that make it a predictable electricity source. The sugarcane harvest likewise coincides with the dry season in southern

Brazil, making bioelectricity a perfect complement to hydroelectric generation. Disposing of accumulated bagasse used to be an environmental problem; however, larger mills such as Equipav, the largest bioelectricity generator in Brazil, now buy accumulated bagasse from other mills to produce electricity. As a clean-burning source of power, electricity generated from bagasse reduces greenhouse gases creating Carbon Emissions Reduction credits (CERs) that can be traded or sold. Indeed, Carlos Silvestrin, Vice President of the Sao Paulo Association of Cogeneration of Energy (COGEN-SP), told Econoff that COGEN-SP recently signed an MOU with the World Bank to develop an internet auction for carbon credits resulting from cogeneration.

Free Revenue

¶5. (SBU) Bioelectricity is an extremely lucrative, low-cost, energy source, which together with various financing and discount incentives, is prompting traditional sugar mills to incorporate bioelectricity into their product mix. Plinio Nastari, President of the sugar and ethanol industry consultancy Datagro, described bioelectricity as a valuable bi-product and equated bioelectricity for Brazilian sugar and ethanol producers to distiller's grain for U.S. ethanol producers. According to Claren Power, a Virginia-based company that recently entered the Brazilian bioelectricity market, the domestic market would total USD 24 billion annually if Brazil exploited its full market potential. Depending on which market mills opted to sell their excess capacity, estimates range from R$ 100 to R$ 170 per MW/h (approximately USD 62 to 106). As an example, Equipav just closed a USD 250 million deal with International Paper to supply electricity over the next 12 years. Brenco, an ethanol distillery based in Sao Paulo, plans to invest USD 1.5 billion in ten ethanol distilleries, which have a combined installed capacity of 600 MW, equivalent to 10 percent of the two Rio Madeira hydro projects. (Note: According to Aneel, the two Rio Madeira projects, Santo Antonio and Jirau, total 6,450 MW with a total expected investment of R$ 54 billion (approximately USD 34 billion). See Ref A for more information. End Note.) Brenco expects that 20 percent of its revenue will come from bioelectricity.

¶6. (SBU) The increased competitiveness that bioelectricity offers is the biggest incentive for Brazilian sugar mills and ethanol

distilleries. According to the Brazilian Sugarcane Industry Association (UNICA), the average profit margin for mills that sell bioelectricity is 15 percent, while a majority of sugar/ethanol mills are suffering losses due to the decline in the price of the two commodities. Including bioelectricity into the production mix likewise minimizes exposure to commodity price swings. As a result, newer mills are more focused on ethanol and bioelectricity than on sugar production.

Widespread Interest if the Price is Right

¶7. (SBU) Carlos Silvestrin told Econoff that more than 200 mills had registered more than 10,000 MW potential for the three electricity auctions this year where bioelectricity will play a role, scheduled for July 30, August 12, and August 28. The GOB's price ceiling of R$ 149 MW/h, however, could discourage participation and push them toward the free market. Indeed, Marcelo Parodi from Comerc, an electricity trading company based in Sao Paulo, told Econoff that several mills were interested in selling bioelectricity on the free market via electricity trading companies because free market contracts were closer to R$ 170 MW/h. (Note: See Ref C for more on the free and regulated electricity markets. End Note.) As a result, Silvestrin estimated that mills would supply about 5,000 additional MW into the system this year, for a total of approximately 8,000 MW of installed capacity. (Note: According to Aneel's Electricity Matrix, Brazil has 3,160 MW of installed bioelectricity capacity from sugarcane as of July, about eight percent of installed capacity, but only approximately six

percent of actual electricity generated. End Note.)

Innovative Contract Designs Reducing Risk

¶8. (SBU) Unlike hydro generators that produce electricity year-round, sugar mills for the most part only generate electricity during the harvest season, typically from May to November. (Note: Experts generally refer to bioelectricity generation capacity based on half of the excess installed capacity because of this seasonality. End Note.) Newly developed regulated and free market contracts allow mills to sell power during the harvest season, no longer requiring them to buy electricity on the spot market to meet their contract terms in the off-months. Traditional contracts had required mills to supply electricity every day and had forced them to purchase electricity on the spot market, subjecting them to enormous price volatility, during the five months they did not generate bioelectricity.

Investment Incentives

¶9. (SBU) The amount of additional investment needed to enable sugar and ethanol facilities to produce bioelectricity varies widely depending on efficiency and distance from existing transmission lines. For mills that only require efficiency upgrades, the costs are minimal compared to potential revenue gains. Plinio Nastari told Econoff that mills could pay off efficiency improvements such as new boilers and generators within three to four years, while doubling their return on investments by expanding excess generation capacity by as little as 15 MW. The efficiency gains of upgrading from a typical 21 bar boiler (circa 2005) to the more efficient 90 bar boilers currently available, are more than 260 percent. Carlos Silvestrin told Econoff that it would cost USD 10 billion for two thirds of mills to upgrade to 90 bar boilers, which would increase installed capacity to 14,800 MW and bring Brazil's total installed generation capacity to nearly 113,000 MW, or approximately 13 percent of electricity generation. (Note: See Refs A, B, and C for more information on Brazil's electricity generation. End Note.)

¶10. (SBU) The GOB's investment incentives, including attractive financing terms with the Brazilian National Development Bank (BNDES) and discounts for transmission costs, have also encouraged mils to upgrade their facilities. (Note: The price per MW/h includes the cost of using transmission lines from the generation source to the

Chamber of Commercialization of Electrical Energy (CCEE) and also transmission from CCEE to the consumer. The GOB gives a 50 percent discount to generators that produce less than 30 MW of electricity from renewable energies, including hydro, biomass, wind and solar energy, which brings down costs and provides cheaper power for the consumer. End Note.) Similarly, Saturnino Sergio da Silva, Vice President for Infrastructure at the Federation of Industries of Sao Paulo (FIESP) is working with the Sao Paulo government to secure state tax benefits for efficiency improvements, and told Econoff that Chief of Staff Dilma Rousseff had guaranteed federal benefits if Sao Paulo succeeded. Silvestrin told Econoff that mills are partnering with investment funds and other private equity investors to form special purpose companies to split up generation capacity into smaller units to take advantage of government incentives offered to small scale generators (less than 30 MW).

¶11. (SBU) Many Sao Paulo mills already have access to the grid and require only retrofit investments; however, connecting to transmission lines would require significant investments for many mills in the states of Goias and Mato Grosso do Sul. Nastari estimated that one kilometer of high voltage transmission line would cost approximately USD 300,000 and noted that several mills are more than 50 kilometers away. The issue of funding transmission lines forced the GOB to delay electricity auctions twice while the Ministry of Mines and Energy negotiated an agreement with UNICA that helped mills finance these connections.

Bright Future Ahead

¶12. (SBU) Bioelectricity has the potential to be a powerful force in the Brazilian energy matrix. Second generation technological advancements to incorporate sugarcane tops and leaves (known as trash) as a source for bioelectricity generation do not currently exist, but will eventually make significant contributions. UNICA estimates that if both trash and bagasse were used, mills could nearly double bioelectricity generation without additional sugarcane production. According to Onorio Kitayama, UNICA's bioelectricity expert, by 2012 mills on average would contribute more than 4,000 MW to the grid using 75 percent of bagasse, but could contribute an additional 3,000 MW by using only half of the trash. (Note: One fourth of the bagasse would be used for cogeneration and half of the trash would be left on the fields as fertilizers for future crops. End Note.) Kitayama noted that his estimates were based on current boiler efficiencies, and that he expected significantly greater gains based on projected technological advancements. Gasification technology currently under development would improve efficiency and output of bioelectricity and allow flexibility in feedstock (including using the trash) for electricity generation. According to Kitayama, gasification would triple the efficiency of steam boilers and also could incorporate other feedstocks to drive year-round bioelectricity generation.

Comment

¶13. (SBU) Bioelectricity will play a key role in determining the winners and losers within the sugar and ethanol industry. Those that adapt to capitalize on this developing trend would have a competitive advantage over traditional mills. Incorporating bioelectricity into the national electricity grid, whether through the GOB sponsored auctions or free market contracts, would also provide more energy assurance for the private sector to make long-term investment decisions.

¶14. (SBU) At first glance, bioelectricity appears to compete with cellulosic ethanol for the same primary input, bagasse. Indeed, first generation bioelectricity, burning bagasse via steam boilers, may limit the receptivity of Brazilian mills to second generation cellulosic ethanol production, and until world ethanol prices outpace Brazilian electricity prices, it may play second fiddle. However, the same technologies under development for cellulosic ethanol, specifically gasification, would also revolutionize bioelectricity development, providing an opening for both to play a

role in Brazil's biofuels future. Bioelectricity also provides an opportunity to encourage mills to incorporate other feedstocks to produce electricity in the off-season. During the recent exchange visit by U.S. scientists to Brazil under the Biofuels MOU, the U.S. scientists identified bioelectricity as a promising area for bilateral collaboration for continued focus under the MOU (Ref D). End Comment.

¶15. (U) This cable was coordinated/cleared by the Embassy in Brasilia.

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